

Experiment 1 Preliminary Work

Diodes and Rectifiers

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1 Introduction

2 Step 1

Notes on signal generators, oscilloscopes and multimeters are studied and reviewed the fundamentals.

3 Step 2

Notes on diodes document is studied. The datasheets of the diodes to be used in this experiment are reviewed, which are [1N40007](#) , [BA159](#) ,[AA119](#) ,and [BZX55C-6V2](#).

4 Step 3

In this step characteristics of linear modeled junction diodes are analyzed according to the I vs V equation as follows,

$$I = I_s [e^{\frac{qV}{n k T}} - 1]$$

Ideality constant n is taken 1 for both cases. From explanation in the manual $\frac{kT}{q}$ is taken as 25 mV at temperature (20°C) . The common piecewise linear model for a junction diode is given in Figure 1.

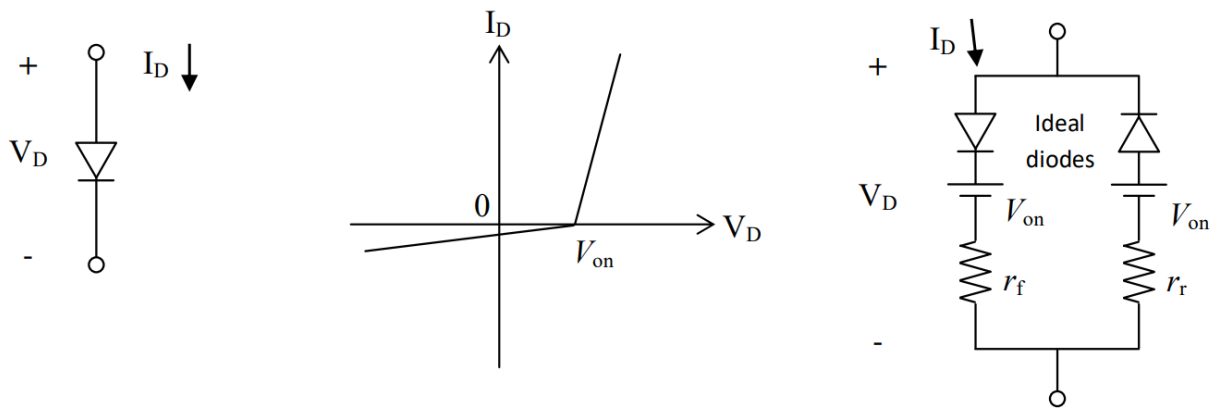


Figure 1: Common piecewise linear model for a junction diode.

4.1 a)

Table 1: I vs V

V(Volts)	I
-0.40	something
-0.20	something
0	something
0.10	something
0.20	something
0.30	something
0.40	something

4.2 b)

Table 2: I vs V

V(Volts)	I
-0.40	something
-0.20	something
0	something
0.10	something
0.20	something
0.30	something
0.40	something
0.50	something
0.60	something
0.70	something
0.80	something

5 Step 4

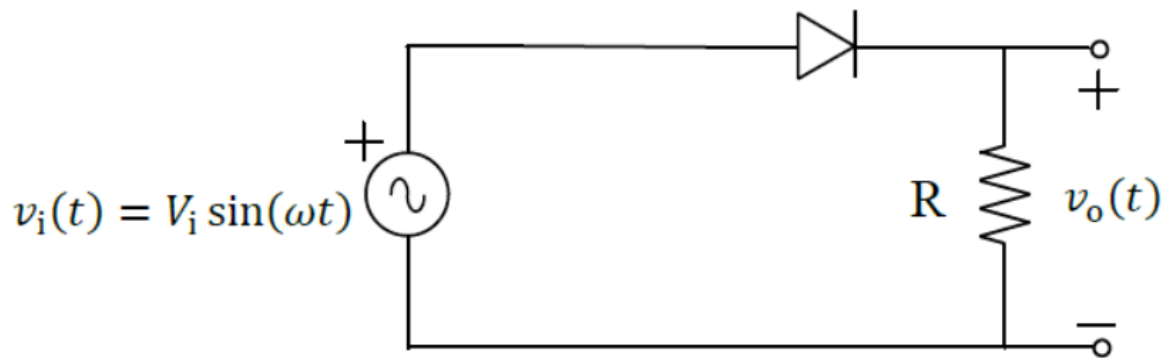


Figure 2: Half-wave circuit schematic for the Step 4

6 Step 5

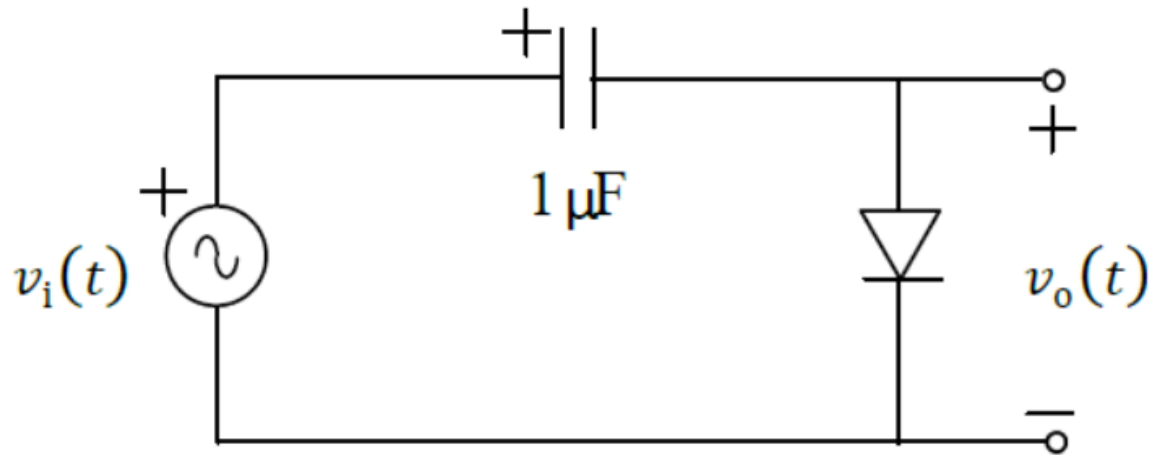


Figure 3: Diode clamper circuit schematic for the Step 5

6.1 a)

6.2 b)

7 Step 6

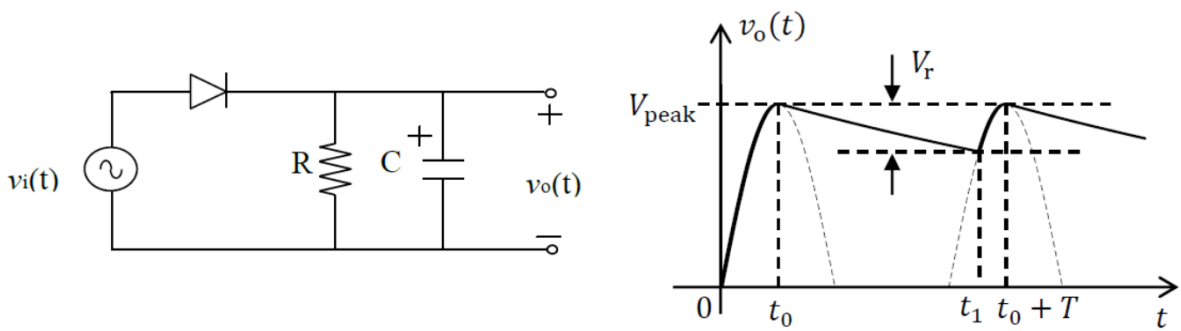


Figure 4: Half-wave rectifier circuit schematic for the Step 6

7.1 a)

7.2 b)

7.3 c)

8 Step 7

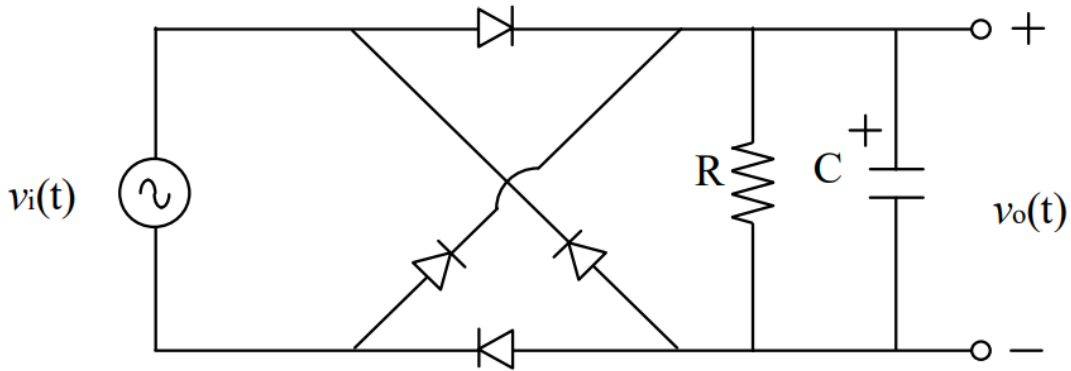


Figure 5: Full-wave rectifier circuit schematic for the Step 7

9 Step 8

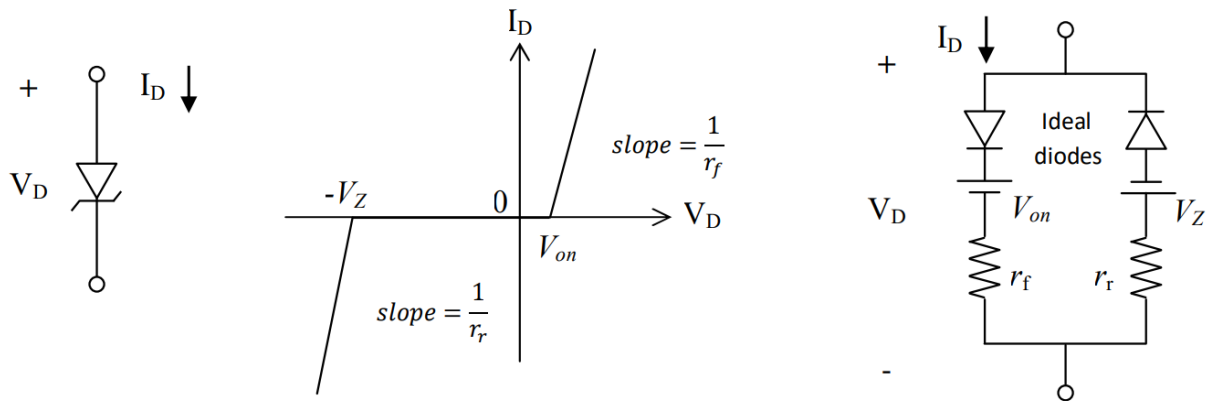


Figure 6: Common piecewise linear model for a zener diode.

10 Step 9

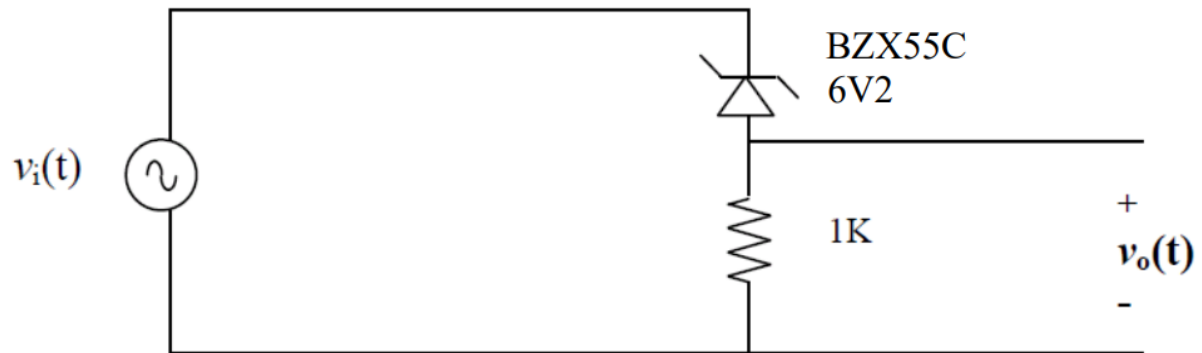


Figure 7: DC level shifter circuit schematic for the Step 9

11 Step 10

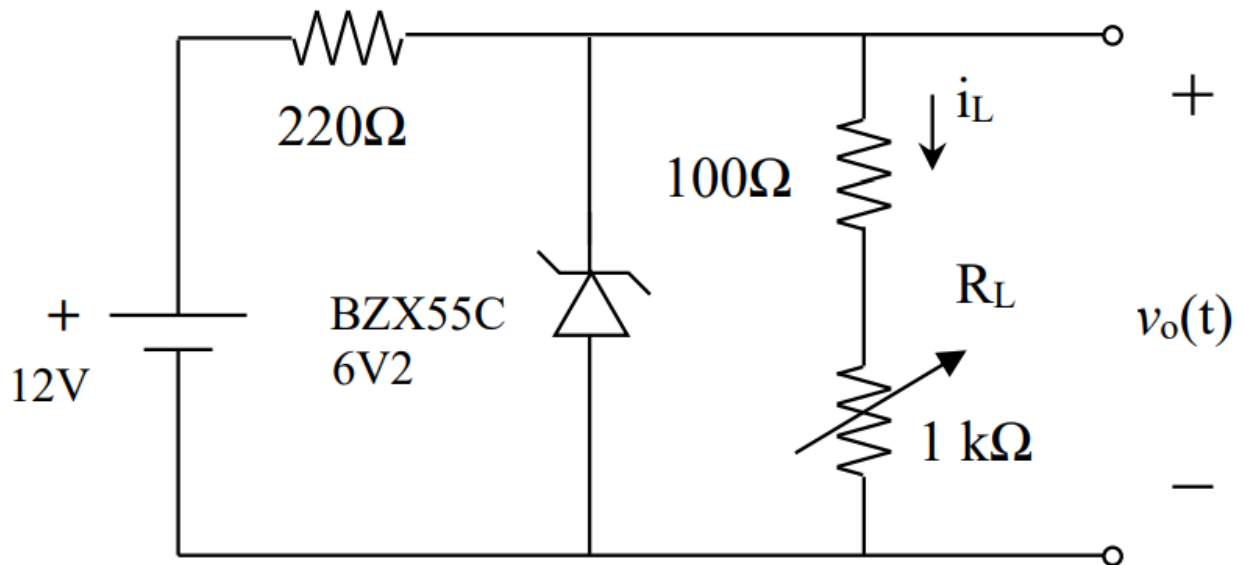


Figure 8: Regulation with zener diode circuit schematic for the Step 10

12 Step 11

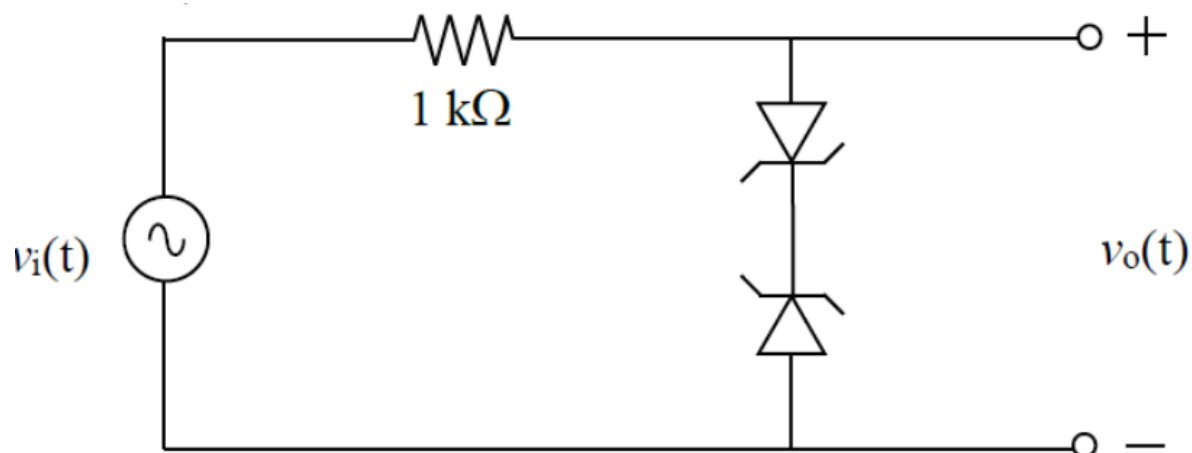


Figure 9: Full-wave rectifier circuit schematic for the Step 11

13 Step 12

13.1 a)

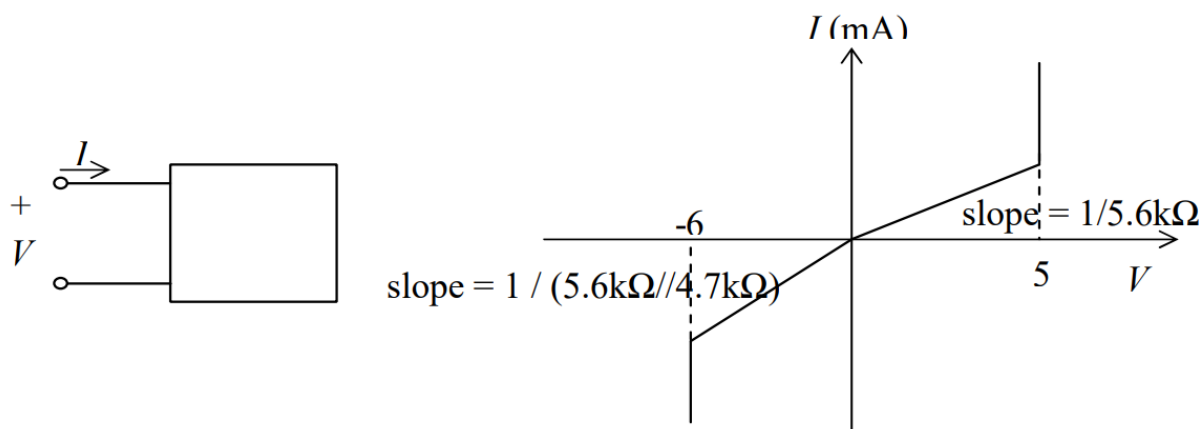


Figure 10: i-v characteristics of a box for the Step 12 part a

13.2 b)

Part b.

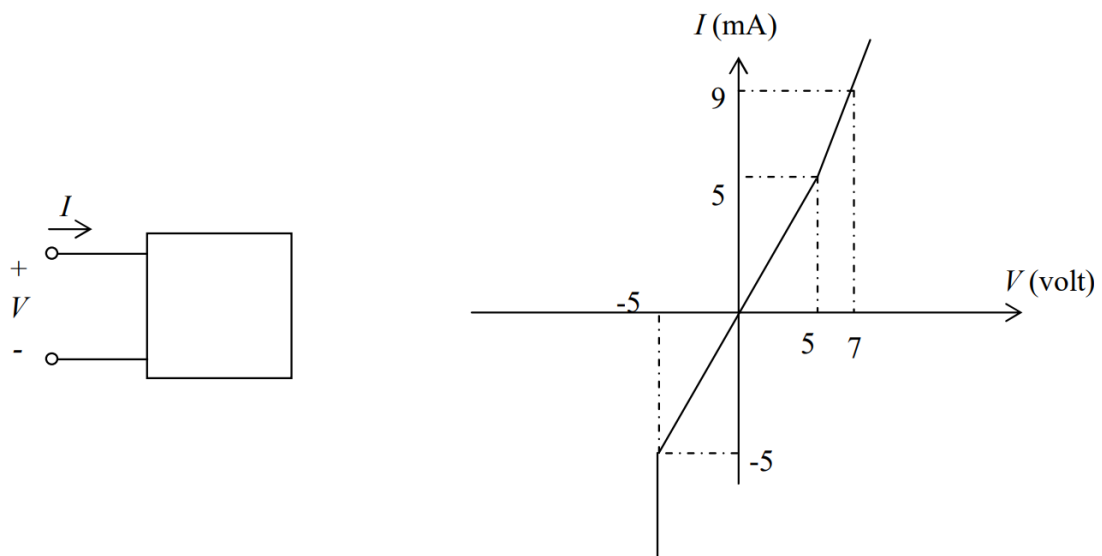


Figure 11: i-v characteristics of a box for the Step 12 part b

14 Conclusion